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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/884,215	06/19/2001	Kyung-Ju Choi	01-4AAF DN 7985	3783
27868	7590	02/22/2005	EXAMINER	
JOHN F. SALAZAR MIDDLETON & REUTLINGER 2500 BROWN & WILLIAMSON TOWER LOUISVILLE, KY 40202			FORTUNA, ANA M	
			ART UNIT	PAPER NUMBER
			1723	

DATE MAILED: 02/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/884,215

Applicant(s)

CHOI, KYUNG-JU

Examiner

Ana M Fortuna

Art Unit

1723

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 July 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19, 21-22, 48- 50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19, 21, 22 and 48-50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Allowable Subject Matter***

1. The indicated allowability of claims 13, 14, 16-22 is withdrawn in view of the newly discovered reference(s) to Chu et al (6,713,011). Rejections based on the newly cited reference(s) follow.

### ***Claim Rejections - 35 USC § 112***

1. Claims 16, 17, 49, 22-49 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims above are unclear as to whether "emitting the strands at a flow rate of "0.6 cubic centimeters per minute is intended. The claims are incomplete and unclear as to whether the claimed ranges and values pertain to a rate of emitting the fibers.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
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Art Unit: 1723

2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
1. Claims 1-19, 21-22, 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gogins et al (6,716,274)(hereinafter '274) in view of Chu et al (6,713,011)(hereinafter '011). Reference '274 discloses electrospinning composition comprising water, water soluble polymer, e.g. PVA, and crosslinking agents for the polymer, an alternatively and additive; to form nanofibers on a substrate (column 2, lines 9-51, column 3, lines 34-54, column 4, lines 67-68, through column 5, lines 1-215, and in particular column 5, lines 9 and 21-22). Crosslinked and non-cross-linked PVA are also disclosed by '274 (column 8, third paragraph, column 32, lines 46-68, through column 33, lines 1-15, and column 34, lines 40-61), the last column teaching crosslinking PVA with polyacrylic acid. The adjustment of the voltage depending on composition is not disclosed in the reference. The composition excluding the additive or copolymer or the addition of surfactant as disclosed in the reference is not disclosed, however, the claim as written does not exclude the addition of other components is a small percentages, e.g. additives.

The sharp tip source diameter (spinneret tip diameter), and fiber rate of formation is not disclosed in reference '274.

Reference '011 teach nanofibers formation by electrospinning water soluble polymeric compositions to form membranes, collecting the fibers on a substrate (ground support) (Abstract, column 1, lines 1-29, column 2, lines 1-68, through column 3, lines line 11); the polymers for the fibers are disclosed in column 13, lines 40-50, which includes,

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Art Unit: 1723

PVP, PAN, methacrylate (water soluble). '011 also teach using the electrospinning technique for any fiberizable material (column 12, last paragraph). '011 further teaches the spinneret diameter of 700 microns (0.7 mm), which falls within the claimed diameter of the claims above (0.1 mm to 3mm).

The voltage range, as claimed in claims 13, 14, 22, 48, is also disclosed in '011 (column 8, lines 12-18). The emission rate of the fibers, as claimed in claims 16, 17, 22, 49, and 50 is also taught by '011 (column 8, third paragraph).

Reference '011 further teach the polymer composition including the polymer and solvent (column 7, lines 41-45, column 8, lines second paragraph). "Crosslinking" the polymer composition is not disclosed in '011. PVA is also not disclosed as the polymer.

It would have been also obvious to one skilled in the art at the time the invention was made to produce the fibers from the cross-linked composition, e.g. PVA (dissolved in water) and cross-linking agent, depending of the desired degree of hydrophilicity, and strength of the final microfiber property, since '274 teaches crosslinking and combination with hydrophobic materials or additives to improve nanofibers lifetime and operational properties (column 5, lines 4-24). It would have been obvious to one skilled in the art at the time the invention was made to use conventional crosslinker agents to reduce the level of water solubility of a water soluble polymer in a final nanofibers filter, based on '274's teaching. It would have been further obvious to operate the process of reference '274 under the electrospinning conditions, e.g. spinneret, rate of production of the fibers, and voltage ranges, and polymer amount suggested in reference '011, to reach to a filter containing nanofibers with diameters on the range of 10 to

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Art Unit: 1723

1000nanometers, in particular 20 to 500 nanometers, e.g. by adjusting process conditions. As to the crosslinking agents, they can be added to the process of '011, e.g. in a very low amount, lower than 5% of the crosslinking agent is generally required to crosslink a water soluble polymer.

As to claims 2-3, the percentages of polymer and crosslinking agent are disclosed inn '274 (column 32, line 65, column 38, lines 54); using water as the solvent is also disclosed (column 39,lines 12-15).

As to claims 4, the composition is solution, e.g. PVA, water plus crosslinking agent and optionally additive is disclosed in '274, as discussed above.

Regarding claims 5-11 the crosslinking agents for PVA are disclosed in '274, column 9, lines 48-59). As to claim 12, the results of crosslinking e.g. formation of three-dimensional structures is inherent to the crosslinking reactions of covalent bonds formation. As to claim 15, the steps involved in the electrospinning process are known in the art as recognized in '274, as technique for producing nanofibers (column 2, lines 18-43).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ana M Fortuna whose telephone number is (571) 272-1141. The examiner can normally be reached on 9:30-6:00 M-F.

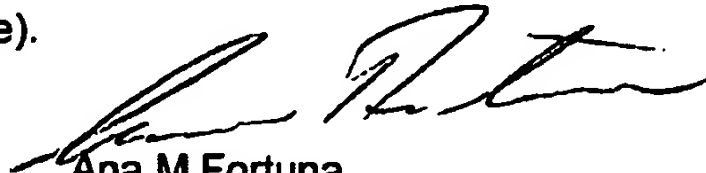
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L. Walker can be reached on (571) 272-1151. The fax phone

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Art Unit: 1723

number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ana M Fortuna  
Primary Examiner  
Art Unit 1723

AF  
October 04, 2004

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